

SURVEY AND PROSPECT NUMBER

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Wright is proud of the part it has played in making possible the high-speed, dependable schedules of airline operators throughout the world. Today Wright Cyclone-powered passenger and air mail transports fly more than 100,000 miles every 24 hours over every continent of the Earth, under all types of operating conditions.

Planes speed overnight from New York to Los Angeles... flash between Chicago and New York in 4½ hours... fly nearly half way around the Earth—from Amsterdam, Holland to Batavia, Java—in six days... astounding examples of the dynamic power of Wright Cyclones.

Unknown numbers of miles have been flown in Wright-powered aircraft—in military planes of the U. S. Army and the U. S. Navy; by airline operators throughout the world; and by famous aviators in establishing the many famous oceanic, endurance and speed records for which Wright Engines are celebrated.

The Wright Cyclone has been constantly developed, over a period of 13 years, from 450 h. p. to the present rating of 700 h. p. More than 2,150 Wright (Series F) Cyclones, rated in excess of 700 h. p., have been sold for all types of commercial and military service.



Wright Cyclone-Powered
TWA Douglas Airplane



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Lockheed Air Lines
Curtiss-Wright Condor



Wright Cyclone-Powered
American Airlines
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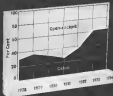


WRIGHT
AERONAUTICAL CORPORATION
PATERSON NEW JERSEY

A DIVISION OF CORTIS-WRIGHT CORPORATION







More and more owners demand closed glass cockpits. Of the 1953-54 production, two-thirds were closed, a complete reversal of the 1932-33 average.



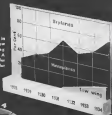
The rising tide of the cabin types (closed segments) has not heavily into the popular three-glass open ship of 1929. The light types of 1934 were unimportant elements in the production of five years ago.



Monoplanes continued in the ascendancy, with low wing types gaining steadily in popularity. A positive correlation for light planes accounts for the peak of 1931.



Water-cooled engines (shaded high) are already becoming negligible factors in current airplane production. The QF-5, produced in 1939, now powers but 1 per cent of the total, is overshadowed by converted automobile engines.



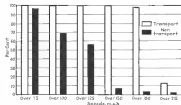
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The Designer Shapes His Course

Transport design practice sets the pace

PLACES of 1934 reflect more a small analysis of what's required than the trend of five years ago when customers were supposed to accept almost anything that would fly, and like it. Speed, more than any other factor, influenced current design practice, somewhat for the general adoption of airframe exclusively racing formulas for commercial types. The wing in the monoplane (latterly in the low wing) is but one symptom. The trend toward full cockpits is another, although in this case passenger comfort is the dominant motive.

Many airplanes of 1934 carry features entirely unknown five years ago. In 1929 most monoplane cockpits were in evidence, lower control wings. The retracting landing gear was almost unknown, and wing flaps had scarcely been seen outside the laboratory. Considerable training aids on movable surfaces have practically eliminated the heavier and were complicated by and stabilized airplane mechanics. Transport designers have led the field in the adoption of these features, but producers of smaller ships are beginning to show signs of interest. New designs of all types, as reflected by the number of Group 1



The desire to go places in a hurry is reflected in the top speeds attained by 1954 ten-year-old airplanes. Five years ago 125 m.p.h. was a good average figure.

AFC's issued Model 38 against 28 of 1931, 39 for 1932.

The monograph charts on the page opposite are from Department of Commerce production reports for 1934. The pie charts are based on the bi-monthly letter lists of the Aeronautical Club of Commerce.

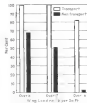
Engine Design

Most marked of the changing conditions in the commercial power plant field is the practical elimination of water-cooled engines. The QF-5, widely used in 1929 airplanes, has practically disappeared, powers only 1 per cent of 1934 production ships. The only other liquid-cooled engines that figure at all are converted automobile

engines, chiefly Model A Fords. Most of these go into basic tank ships, although there is one factory model that can be purchased with such an engine. In 1929 there was no real light plane development as we know it today, therefore very little use for such engines as the small 2- and 4-cylinder opposed, and the 6-cylinder radial, requires this segment for a fairly large segment of the 1934 pie. The 6-cylinder radial group of 1929 was made up entirely of the Curtiss Challenger, a type which has been all the market for a number of years. The relative proportion of larger engines (the 6-cylinder radial) remains about the same but the 3- and 7-cylinder radial groups have already shown some increase in popularity.

1934 Airplane Characteristics

as revealed from a study of 95 transports and 547 non-transport types produced in factories and licensed or identified for the first time between Jan. 1, 1934 and March 9, 1935. (Aeronautical Club of Commerce reports)



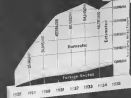
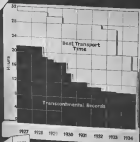
Five planes for the private sector carry more than 95% per cent of wing-area than transports carry less.

	Transport (95)		Non-Transport (547)	
	Number	Percent	Number	Percent
Metal monocoque fuselage	37	81.0	1	1.1
Metal wing spar	95	100.0	3	0.5
Metal wing covering	18	32.0	1	0.2
Retracting landing gear	95	100.0	11	1.7
Wing flaps	24	77.9	150	23.2

An important record of at least 15 per cent passenger traffic increase each year since the preceding one remains unbroken.



Passenger traffic (in passenger miles) in the world's air routes. The United States has an easy majority over the rest of the world, as shown in one lead over its nearest rival. Other countries are arranged in their order of traffic volume.



Scheduled times and one-way records consistently show just about half as long again as the three-standing transcontinental record. Both have been cut down a half in six years.

Airplane mileage on the transport routes. From the south to the sea and back, with a couple of dozen round trips in the mean to open in the past four years.

Transport Traffic and Operation

Passenger travel moves up with new equipment

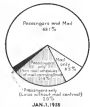
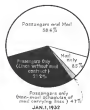
I REALLY want color printing to make a survey of American air transport to a new standard. The review of operating performance and promise can properly be painted in black, or better still in gold. The optimistic view of the past year on the other hand needs to be done in red ink, and red will continue to be the appropriate color unless or until Congress comes to the rescue and allows someone to do something about our real rates. If all these misadventures had begun to happen in the early spring of 1952,

or perhaps even of 1953, the disaster would have been prompt and total. As it was, Old Man Trouble delayed his descent upon the airlines until their traffic was so well grown and their re-equipment programs so far advanced that not even an economic earthquake could shake them entirely loose from their foundations. The outcome of the earthquake has been bad enough, and the walls will yet give in unless someone hurried along with some financial prop, but the symmetry of the structure hasn't yet been destroyed. The old ship has been through a lot of rough weather, but she still has her vision and she's still flying.

All of which is a roundabout way of saying what could be said more specifically and matter-of-factly in statistical terms.

Despite political hell and economic high water, 1954 passenger traffic was up 8½ per cent over 1953 on the domestic routes and 48 per cent on the foreign ones. Total capacity volume increased 46 per cent. Almost the same number of people used the airlines as in 1953, but upon the average they flew further and faster and more comfortably and with greater individual reliability and less likelihood of interruption by weather.

A further increase for 1955, with high-speed modern equipment in service on most of the main lines throughout most of the year and with no political



Scheduled mileage distribution. The complete passenger-and-mail service becomes all-weathering, will be still more so in another year.

or politically expected, can hardly escape being considerably better again. We have recorded an anticipation of a 20 per cent increase in passenger traffic, though it would be surprising to see the increase again accompanied by any substantial change in the number of passengers. The length of the average air trip on domestic routes may well continue to rise next three or four years. The average passenger on the longer routes now averaging at 350, is also likely to further increase.

Average first in the air

American leadership in this field has ceased to be mere. It has nearly been reaffirmed. Once again, and more so presently than in the past, the difference in volume of American and European air transport shows itself. Passenger 60 per cent of the world's air traffic is moved under the American flag, and if trouble were to take the



Two years of passenger traffic. The Chairman Far produced a 1953 peak, but last year's summer low built up better through the fall. Average traffic is almost also increased.



Last faster up, and bigger ships. The average passenger schedule now carries enough passengers to start a bridge game and provide a kitchen. Four years ago they would have been limited to ramen.



More long-haul business. The typical air traveler now flies about twice as far as he did four years ago. Express schedules, trans-continental connections, are raising the average mile flown.

the contribution that American tourists make to the European sphere. American citizens would probably appear as doing substantial two-thirds of the world's air traveling. At the same time it is evident that the average American transport airplane carries a larger average paying load than that of any other country in the world except Great Britain, where very large transport loadplanes have been in vogue.

On the purely operating side American lines have the credit for getting more intensive use out of their equipment than the operators of any other nation attempt. With only 261 machines on the active roster of the domestic American transport lines at the present time the operating rate is running over 160,000 miles per airplane per year, approximately three times the rate of five years ago. No other vehicle of land or sea has ever come anywhere near that record of annual travel. Neither we believe have other common carriers of modern transportation at all potentially equaled the present intensive airplane record of being able to produce a cubic annual passenger revenue approximately equal to the same first cost of the machine. The net revenue advantage is, under present conditions, quite considerable. The mapping of traffic distribution



But quite as many passengers in 1934 but each one flew farther.

becomes a matter of increasing difficulty as the number of alternative routes between main centers increases and as express services are added to local ones. Quite plain, however, is the continued easy leadership in passenger volume of the New York-Chicago route. With first class of subsidies making various international landings and sea-raising outposts, it averaged 129 passengers a day each way over the last half year. The run from New York to Washington, once an easy first in volume of passenger traffic, has dropped to second place with an average of 60 passengers each way, while intra-California flying has been building up to a daily average of 35 between Los Angeles and San

Francisco, getting back toward the traffic levels of California's private air transport boom of a few years ago when first competing services were connecting the southern and central parts of the state. If the number of routes on which a really very heavy traffic persists throughout the year is still small, the number of regular arrivals on which the passenger volume is absolutely insignificant is also dwindling. Maps like the one represented before prepared in previous years have been fairly treasured with the faintest of lines. There is a better and more modern distribution of traffic



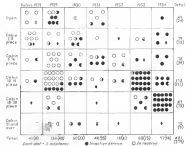
An express increased even more rapidly than passenger traffic. Foreign express more rapidly than domestic.

The figures available so far from the report given at complete a breakdown of passenger movement as the domestic ones, but they indicate an average passenger movement in and out of the country of 48 daily persons each way, making the totals of Cuba as densely populated a bit of air as any along the well-marked routes of the United States.

The end of speculation

It sometimes is grouped by the class of business that they do, the distribution among the groups has changed sharply at the result of the formation of a year ago. The percentage of the total volume of operations that is taken up as a part of the airplane load is now higher than it was ever before. The early spring of 1932. If the reorganization of the late Federal Aviation Commission were to be accepted there would be a further rise of the figure to 100 per cent. For the usual would be put on all transport planes by which it could be forwarded with a saving of time, but even if that advice be completely ignored the chances are that Congressional wisdom, and I.C.C. policy will join together to reduce the proportion of mail-only schedules and to bring the proportion of total mileage down and up to 85 per cent or higher within another year. The mail-only schedule though no relative importance has remained unchanged over the past three years, is also without doubt headed for further reduction.

If the contribution of mail, passengers, and express to the load of the plane is to be the typical rate, the shift to day after tomorrow depends on adding up several items of revenue and cutting them against one. A survey made by the Aviation Commission for the operations of last October shows all the domestic lines together with an average revenue from passengers of 37.8 cents

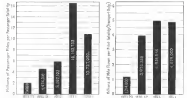


Airline planes—how big and how new. Considering only ships in active operation, the domestic transport system is 60 per cent re-equipped in the last two years.

per mile, times engines of about 2 cents; that of mail of 17.7 cents (the averages being based on all schedules, including both mail and non-passenger). The reported average costs of operation for the same months were 35.4 cents per mile, leaving a loss of 7.7 cents. Passenger load factors ranged from a minimum of 9.2 per cent to a maximum of 25.5 per cent, the latter for TWA, with an average of better than ten passengers on each ship. The highest average of engines and costs suggests low work on United's main continental, 30.3, on each schedule.

Though the total number of airplanes owned by the transport lines has remained about constant over the

last five years, the number being regularly replaced has dropped off with increased speed and improved maintenance quality. If only the ships in actual use be regarded, the obsolescence situation that was so marked a year or two ago has cleared itself up. More than 80 per cent of the planes in actual service at the present time are less than two years old. A large proportion of the remainder ought to be replaced during the present year, together with some additional provision for the expansion of particular services and thus in 1936 will appear the first workings of a replacement demand that will reach its full height in 1937 and the following year.



Security measures—increased by the conditions of the most operation period, still stand for above those of any previous year or at any other large security.



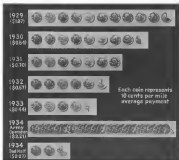
Average Number of Passengers per Day

- 1-5
- 6-10
- 11-15
- Over 15

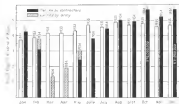
When the air passenger traffic. Average traffic volume, with any peak day, over the last half of 1934

Airlines and Government

What happened to the air mail



Money for the mail, in why nations now run on dollar cost. Circulate past figures.



Monthly mail movement domestic (in millions of pieces length). Last year's curve from January to July (solid bars). But by October traffic was again adding new records.



Up and down of domestic mail traffic. A postage rate cut in 1933, coincident with the air mail launch of the first half of 1934, and as it sticks out with an unduly elastic from the pattern on this page, little need be said in the way of interpretation. The cost surprise in the figure, seen as a whole, is the amazingly quick rebound of the mail traffic during the past fall and winter after the service had been virtually suspended in the spring.

There was a common supposition that the habit of using the air mail would be to last that it would take a year or more to reform, but a restoration of full service of the same order that had provided before February 1934, coupled with a reduction in postage rates from 8 cents to 6, brought the mail back with a rush. At the end of the year it was running 70 per cent lower than it would have done without any cancellations, but in December showed the biggest monthly mail that the service has ever known.

Of the making of comparisons of air power there is no end, but after they are made they are a lot of interpretation. To say that one country has 3,000 airplanes and another 1,500 tells very little about their relative strength and someone gives us some additional information.

Some countries are notably ahead of others in design. Some carry on their rear a large proportion of obsolete ships in virtually dead weight, in the theory that in case of war they would be better than nothing. Some countries have as many as 20 per cent of their total number of planes at training types, while others carry the training planes at all primary training all being integrated in civilian schools.

Comparisons of total numbers of planes are unsatisfactory. Comparison of total numbers of truly military types are extremely difficult to make and still fall short of covering the subject when made. After having used and rejected a number of systems for setting up the world's air forces comparatively we have settled on the number of registered tactical units as be-

Before conflict, and during, and after. What the air mail does the government does.



Air power of the world. Their apparent strength in fact-line units as of the summer of 1974. The United States has 10,000.

IT IS a well-known fact among football fans that if the University of Oklahoma beats the South Tashan (Oklahoma State) by 24 to 0, and if South then turns around and runs 100 yards, South College will be the greatest to the state of 10 to 0, anyone who lost that Oklahoma will therefore take 100 yards to camp at 42 to 0, or be very soon even rapidly concluding that will be a sucker and will lose his money. Football generally refers to reduce this to lower mathematics. So does the air.

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ing on the whole the best and the best meaning of the methods that can be devised.

Almost every great power organizes its airplanes into squadrons, ranging in practically every case from one to twelve squadrons in four-battle strength though in a few cases the number runs as high as eighteen. Where certain squadrons are of comparatively large or small strength, as in the case where several air forces are organized into flights of only one machine each, an adjustment has been made by using such units as being equivalent to more or less than one squadron strength, as the case may be. These are the exceptions, however, and so general the display of symbols across the top of the page represents a straight squadron count. On the average and on an average which would be correct weight 10 per cent for most cases, each squadron can be taken as equivalent to eleven machines in actual first-line service to another machine of distant service types including those in reserve, and to a total of 27 planes owned by the military action, including training squadrons and whatever. Thus a country with 50 squadrons would be expected to possess these 2,400 aircraft in all, of which about 1,500 would be service types and about 1,000 front-line.

The picture is based on the best information available as to conditions

that will exist in the summer of 1975. Where there are in excess of rapid expansion, allowance has been made for the fact. Official figures have been used as far as they are considered trustworthy, but some of them are of little value. In some cases, notably those of Russia, Japan, and Germany, official figures are rather entirely lacking or virtually meaningless and a certain amount of crystal gazing has had to be used along with a variety of reports from many sources, but we offer the product as what we have good reason to believe are reasonably fair estimates.

The comparative rating of the average quality of equipment and the average ability of pilots is even more difficult than getting a count of military planes. It is a matter of recklessness to say anything at all, but we are reckless enough to do it. We estimate that in average quality and in fighting strength per unit of equipment the United States, Great Britain, and Italy would divide the first three positions, with France and Germany somewhere down the line (though the French are rather engaged in a modernization campaign that will improve the average quality of their flying equipment enormously within the next two or three years), and the Russians and Japanese still further down. Neither in quality nor in quantity is there any such thing as a two-power standard in the air.

World Air Power

All nations prepare rapid increases in strength of their air forces.

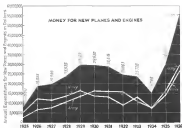
Military Flying

More operation, more purchases, increased emphasis on combat equipment coming

FOR the American air forces, the big news of this or any other year is that the population of the halls of government has at last arrived at a unanimous understanding that a real air force costs money and that one cannot be created by simply passing a law about it.

The law was passed in 1935, but it ran aground on a succession of emergency programs, and good intentions never touched a bomber. Only during the past few months has Washington shown signs of being able to work out that simple realization that says that at least 25 per cent of an air force's equipment must be replaced annually, and that modern military air planes of all types taken together cost an average of over \$50,000 each, including their equipment and that to keep up a total force of 4,000 planes for the Army and Navy accordingly demands an outlay of something over \$500,000,000 a year, not demands a penny more—not just once in a while, in a biennial kind of enthusiasm. In the next fiscal year the \$50,000,000 figure will be entered for the first time since 1918, and, at approximately that, at least the total of serviceable ships in the two services ought to be built up to about 3,200 by three years from now.

The picture outlined over these two pages is full of reminders of the Army's unhappy experience in World War I and of the recommendations of the Baker Board. There is to be more money for modernization and for the more complete equipment of service planes with instruments and aerial-

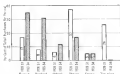


New equipment Next year's allotments promise an end to six years of stalling on new development plans

ances. Funds are to be concentrated much more than in the past upon those types of airplanes. During the four years from 1938 to 1941 over two-thirds of all the new planes ordered for the Air Corps were training, observation and cargo types. During the last two years, on the other hand, it has been pursuit and bombardment that have accounted for almost exactly two-thirds, and taken together with attack for more than three-quarters of the purchases. Policy's present unadmitted preoccupation continues to fully that high a percentage of combat ships for the immediate future.

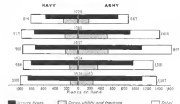
More hard-line plans

The same thing shows up in the presentation of total equipment on hand, with the prospect of less than a fifth of the Army's planes a year from now to be of the average well-traveling type an equal more than a third of the total in those groups five years ago. The same indication is present again in the reduction of service squadrons,



How the Air Corps built. Relative number of planes of each type purchased over five recent periods

where the Army has been making enormous increases in the number of squadrons for various forms of combat and holding the observations mainly just about constant. There is a surprise there in the comparison of the Army and Navy. The Army has three-quarters of its total squadrons, assigned to pursuit, attack, and bombardment, while the Navy has that one-third of its total on those services and over two-thirds engaged in patrol, scouting, and observation. It looks very much as though the development of eyes for the dark night have gone on at the expense of fists to strike the blow, but that again leads to the shortage of com-



Planes in stock, service and non-service. Training ships reduced, service types promise to close a definite increase.



Safety in the Service. Down a little from 1918, both Army and Navy still stand above 10,000 hours flying for each total soldier

bat squad, since all the fighting and bombing squadrons are current.

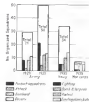
Bigger appropriations for equipment seem higher air forces. That means more flying and so has increased flying isn't waiting for the increased equipment. Recent experience has brought all hands to agree on the need for more practice in the air. The Army's total rate for the present fiscal year promises to be up slightly from the next highest figure since the War with the plans and estimates of that sort not passed during July 1 bill for raising the 1935 record by almost a half again. Where officers of the regular Air Corps have been averaging 200 hours of flying each year or less, the promise now is for well over 200.

The Navy's prospect for next year is not yet available but it is more they have been running along with the Army on about a 200-hour basis.

Safety records in the service last year were somewhat inferior to those of the previous year or three years, but it is still doubtful if any other service

in the world can show that equal. The temporary increase in the Army's performance is to come largely due to the increase of the air unit operation. The demand on both services for an increased amount of bad weather flying and for a generally closer approach to war conditions may be expected to stimulate that a few weeks the resumption of the steady and extremely rapid progress toward unprecedentedly high safety records that had marked the previous eight years.

The statistics that show amount of flying time and freedom from accident include the Reserve as well as the Regulars. Aside from the 220 officers on extended order duty with the Air Corps (mostly for one-year terms), Reserve recruits a total of only 12,000 hours of flying last year. For fiscal year there is to be an allowance of 20,000 hours, almost as much as was flown in 1951. Six hundred and fifty officers will be expected to take a minimum of four hours of flying



Totals with in the United States. Last year, Navy spending, in the second

such per month, and the Reserve will then be even shorter of having a proper proportion of strength to the regular Regular service than it was in 1930.

As the number of planes in service and the amount available for purchase and replacement are pushed upward it is more and more important to keep the new ships up to the highest pitch by doing plenty of doghouse work. It is starting to feel that the number of new experimental types derived from the Air Corps for test has dropped from two in 1952 to five last year. Last year the experimental airplanes standing at \$1,000,000 for the Army and \$2,500,000 for the Navy for the year to come are considerably increased if it gives it be a price. A problem is spent the quantity produced every year and that the last dollar's worth of quality is being laid down. A good system of design development, however, must go for to fix that up.

Acknowledgment

NOTWITHSTANDING, a joint statement of both figures and miscellaneous information such as I'll share pages does not proceed from organization. It calls for both, however, from some, official and unofficial sources, and comments for the flying on half-a-dozen, disconnected lines, together in making a single conclusion. We have aerial march or to help from ground and aerial units to increase in aviation industry, but it is most no product objection is to do more, at government and to make connections of the industry and governing bodies in the world in aeronautical work.

Taking upon ourselves, but regardless for some of presentation and for

conclusion, we wish to make special acknowledgment for assistance derived in securing the material for our studies from the Bureau of Air Commerce and of Foreign and Domestic Commerce of the Department of Commerce. From the Aeronautical Chamber of Commerce from the Civil Aeronautics in the Commercial Aviation Industry, from the War and Navy Departments, from the National Advisory Committee for Aeronautics, from the National Aeronautics Association and from the Editors of *Aviation*. To them, and to others in the Aeronautics and in Aviation, we express our appreciation for their participation in making such a review possible.



Total in the Air. By next year the Army and Navy together will be flying down to a million fewer a year, 400,000 under a day.

Speed, Distance, and Altitude

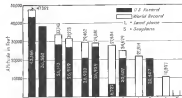
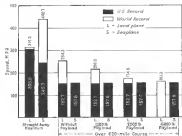
World's records that lie within easy reach of American commercial planes

THE most striking thing about the list of world's records now standing is the amount of fruit that hangs on the tree for American commercial machines to pluck.

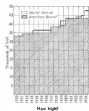
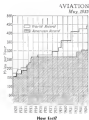
Take, for example, an illustration of speed records with var-

ing commercial birds. Look at a "world's record" of less than 179 m.p.h. for a 620-mile flight with 2,000-lb. payload. There are at least four standard American transports and a bomber that could raise that figure by 100 per cent without the slightest

ing commercial birds. Look at a "world's record" of less than 179 m.p.h. for a 620-mile flight with 2,000-lb. payload. There are at least four standard American transports and a bomber that could raise that figure by 100 per cent without the slightest



Speed and altitude, with and without payload. America, already holding most of the long-standing records, could easily replace most of these far landmarks.

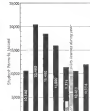


The history of speed, distance, and altitude American and world's records since 1912. Landless or airplane figures have been used, whichever was the best for the time being.

changes from their stock conditions. There are at least three that, with an amount of overhauling perfectly permissible for competitive purposes, could put from 10 to 20 miles on top of the present speed record with 4,000-lb. dead load, a performance for which there is as present no American figure whatever.

The chronology of record-making shows, as might be expected, the influence of specialization. America has shown here with the leaders in making altitude records, and has actually held the world's record almost exactly half of the time for the last fifteen years as the result of having had the first serviceable superchargers and of having always kept well to the fore in the design of extreme high-altitude superchargers on engine assemblies. Speed records departed from our shores when we abandoned racing as a national enterprise. The distance record has never been the subject of a really concerted American drive. The American attempts have always been individually sponsored and carried out at limited expense and with one-track airplanes, and it is a great tribute to American commercial design under the circumstances that our distance record stands as high as it does.

There is no reason to doubt that any or all of these figures could be brought back to the United States if the long-ago record were worth the price. The prize might be several million dollars. Consideration of commercial and industrial effort on a new objective of an immediate and direct concern to military policy seems likely. If the money is provided the records can be had.



United pilots made annually. They figure as easily 1 per cent of the total number of young men reaching the age of 21 during the year.

Pilots and Pilots-To-Be

New students grew in number, as do transports

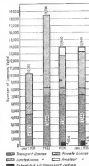
IN LOOKING to the future of the airplane market, no better index can be found than the listing of those who have been satisfactorily introduced as aviators at least to show a desire to learn to fly. They are the future customers for airplanes at once as their postgraduate period, and students even sooner than that for instruction and for flying time. They are the home-builders of light planes, and in general they are the backbone of the non-transport section of aviation interest.

The total of pilot licenses in force suffered a terrible setback two years ago when the Department of Commerce got drastic and decided to impose on the private pilot an experience requirement more severe than any other government in the world was demanding. The number of private licenses faded instantly to about half its previous strength. If the regulation had not been so severe, it is probable that the total number of licenses would be back near the 25,000 mark again within a few months.

Under the old license rules about 4,000 new pilots were being created each year. Under the new rules the



Play-by-play score in student numbers. The 1935 figure is data in early months compared to that of 1934, as present one new two-year and airplanes and remains have been used to play a part in the total of new license.



Pilot's license, subdivided. The big drop of two years ago was due to a change in rules. Note that the number of pilots at last holds its own, and shows signs of improving.

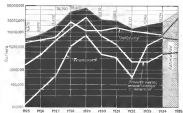
students have taken such a setback to their progress toward their license that only about 1,500 of them are qualifying annually. The number of licenses in force having remained almost constant during 1934, at least 1,600 pilots must have dropped off the list to make way for the newcomers, mostly for economic reasons connected with the depression.

With student pilot rates running about 12,000 last year and barely enough of the similar qualifying fee income, the economic factor is to guide again the responsible one. It seems quite possible that the number of students qualifying in pilots can be multiplied by five, with very little delay, on a general return of normal employment conditions.

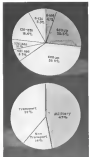
New Production

Transport manufacture, foreign trade, at record breaking levels

NINETEEN THIRTY-FOUR and distribution will be known to history as the years when transport production came into its own. Combined, 1934 lives up to what we can very confidently regard as its promise: they will show a larger total value of transport manufacture than ever 1928 and 1929. In the aviation calendar, however, which started off in 1924 as a very young bird, it also tended to break all records. Last year, for the first time since 1928, military production fell behind that of civil airplanes in value, but did not do so in terms of getting back to over 70 per cent of the total output of the industry. Even



Airplane production in dollars. The present year looks back toward 1934.



Top: Segment of the year (types and figures included) by group groups. The figure is in terms of dollar value of production, and covers only the production of the regular airplane-making industry (shaded area military).

Bottom: The airplane industry's output for 1954 by value in its three divisions. For the first time in five years civil production exceeds military.

though except the private-owner market is coming along in buoyant demand of the depression. Even that is headed west strongly in the right direction, though it has a long way to go before regaining the business figures.

As would be expected, export figures generally follow those for the planes. The production of large engines for commercial service last year even exceeded the 1929 figure, and this year it might be better still. That engine, as with airplanes, it is true that military production was below commercial in 1934 for the first time in five years but that it will rise well above the commercial figure again for 1955. It makes less difference there the larger commercial engine, and the military ones being so much interchangeable. More striking is that, as shown in the left vertically 66 per cent of all engine production (in dollar value) in the United States during the year were now in power plants of 600 hp. or more. Four years ago the proportion would have been well under a third.

Now ships for replacement

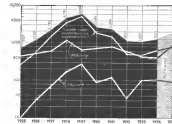
Something has been said elsewhere in the current and in the house of representatives, about the cost of new planes that may be drawn on it, also be extended a bit here. Among trans-



Engine production, in total value and in its subdivisions.

ports there is an immediate need for some 30 ships, two-thirds of them multi-engine, for replacement of obsolete equipment. Despite the reluctance of governments to have sub-subsidized airlines, as shown for their equipment, foreign might be taken about money. American ships. Increased frequency of schedules and the starting of new lines will, it is believed, the Post-Office don't act so too steep a cut at harder take another ten or twenty. Say 15 transports in all, and at an average price of 100,000 each, substantially last year's level.

The grants in air and aircraft-engine commercial field will, as elsewhere required in detail, about 600 new ships for replacement of worn-out and they might be taken about 200 more for extension of the total number in service. Some increase in the value of operations and in the



Number of planes built, for military and for civil purposes. The home builder is excluded from the totals.

number of planes needed to keep it up in 1935 is almost assured. It is interesting, incidentally, to notice the gradual decline in the average price of ships in this group from \$4,000 (without engine) in 1927 to approximately \$4,800 now.

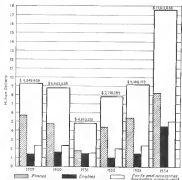
It is even possible with a little consideration to project these figures beyond 1955. The normal rate of growth that can be anticipated for transport operations should call for 400 machines in active service by 1958. Possibly 60 of the present stock will still be flying three years from now. For replacement, for outlayings for airports, assuming the work of the machine to sport calculations, there should be a market for about 80 new transports in 1956, 130 in 1957, 200 in 1958.

Private plane production

As far as production for private ownership, it is much more difficult. Everything depends upon the extent to which technical development, whether sponsored by the Department of Commerce Development Section or undertaken by manufacturers on their own account, is going to make existing planes obsolete. At least it seems safe to assume that no one of the next four years will be below 1934 in production of the smaller types of craft and that sometime not later than 1937 the industry might be hit by a stroke of 1,500 planes a year or better.

All these figures, both for numbers and dollars are for factory production only. Based on the reports made to the Aeronautical Chamber of Commerce, they eliminate entirely the amateur builders, the problem of custom-built racing machines and other

specialists of that order. The dollar value is estimated in not great and even if it could not properly be counted as forming a part of industrial production, but to put a complete record of the number of machines produced somewhere around 150 of the



Experts on the up and up. All records disappear in a total worth that adds 42 per cent of the industry's total production for the year into foreign markets.

home-built variety would have to be added in. The same sort of statistics can be made on the conclusions drawn from the photographic images, and of the one following distribution by engine powers were (like those given under Design Trends on page 164) to be a trend and complete record of every airplane reported as being built in the United States during the year the engine in the smallest power class would show an appreciable gain.

Military programs

The military demand is of course preferable in terms of appropriation bills and pre-announced plans of the Service. In that case there has been no tendency to reduce average cost, but military planes grow more and more complex and expensive to build to the operating units down below their statement that no price is too high to pay for good performance and for a structure suited for field service. In 1938 the average price without engine was \$15,000; in 1934 it reached \$25,000. Within another four years, as military policy now shapes itself, it may easily reach \$30,000.

Though we publish no tabulation of the distribution of the next year's production by make, certain general conclusions from such a breakdown may



Aircraft and engines, continued from p. 179. The width of each line indicates the relative dollar value of air transportation exports in 1934 for: Canada, 19.4; United Kingdom, 20.9; France, 21.5; Germany, 21.5; Colombia, 9.2; Peru, 3.5; Mexico, 3.5; Spain, 3.5.

be reported. The major one is that competition is finally working to shake down aircraft manufacturing into a reduced number of units, as follows the president of every other industry of the last generation. Of all of last year's production, excluding the post-war boom and boom-bust, well over a half of the ships came from the four leading factories, just over five-eighths from the ten leaders. It seems highly probable that three or four years from now 99 per cent of the total production will be in the hands of no more than eight or nine companies.

If the transport and non-transport types are considered separately the tendency to concentration becomes even more striking. The two largest producers of 1934 came had together over a hundred machines licensed or certified during the year. Two others two above

50 only, between about 30. Four more built between twenty and three ships, making ten factories in all (two of them devoted to transport business) with a production of twenty or better.

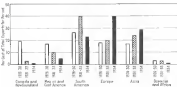
Current markets

The most spectacular production story of the year was not to be found in the growth of transport business, nor in the apparent tendency to rationalize manufacturing. It was in the foreign markets. Not only did the total of aeromarine exports in 1934 break all previous records, but it fell only 5 per cent short of equalling the total of the two last years previously experienced. Not only was the record broken for the total shipments, but individually for airplanes, for engines and for parts and accessories. In fact the only record that wasn't broken was

that for number of engines shipped, for the years when Liberty engines were going abroad by the hundreds at a unit price about equal to that of a second-hand Ford car set a very high mark to shoot at.

There has always been some dispute in the past about which country has had the largest aeromarine exports, and its settlement has been made now the simpler for the wide differences in the accounting methods that are used. All sorts of things go down into the export statistics, even, in some cases, airplanes shipped to the air force colonies, operating in a native's colors. The year however, it should make no difference what method of calculation is used. The volume of American business is surely beyond all comparison. Sir Philip Selous, secretary of the House of Commons, with evident pride, that British aeromarine exports had increased 31 per cent in 1934. It seems a good record of growth, but against the American industry has an increase of 52 per cent to offer.

The geographical distribution of exports of airplanes and what goes with them depends largely on political considerations. Until very recently the great markets were in the Western Hemisphere and Europe, where the great powers preferred to build their own planes in their own factories, was unimpaired. For 1934 Europe alone took more than the whole Western Hemisphere together, and Asia took almost as much. These two continents accounted for 70 per cent of the exports. China and Russia and Germany alone for 30 per cent.



How the aeromarine exports split up. Percentage distribution by continents. Europe and Asia received South America as a market.

Airplanes in Service

Old ships held bright replacement demand prospects

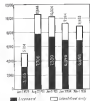
SPECTACULAR statements often accompanied that the number of airplanes in the United States has dropped off by 4,000 in the last few years somewhat exaggerates the facts. About half the decrease has been among the identified machines and represents a true reduction in activity but easily a more careful check on whether or not the machines for which identification numbers are outstanding really exist. It has always been the rule and added still it is that a large proportion of the airplanes were not in flying condition and the true reduction in the number of planes fit for service has been from around 4,500 in the summer of 1931 to a little over 7,000 at the present time—certainly not a very surprising drop during four years at the bottom of the depression pit in the use of an article that for many of its

owners is more of a hoarse than a necessary thing the past year or more there has been no decrease at all and the signs now are all set for a rise.

How rapid the rise will be and how soon the total number of ships owned will overtake the all-time high of the summer of 1931 depends on how much production the world can recover and also upon how rapidly antiquated airplanes are allowed to find their way into oblivion. There are two patterns on this page that have a striking story to tell.

To take the part of first first they reveal the astonishing fact that of some 4,500 machines built in 1928, transports and engines included, approximately 2,000 are still licensed for service. Only about one-quarter of the 1928-built ships there were licensed at the beginning of 1932 had disappeared from the scene in the next three years, and approximately the same rate holds for the 1929 and even for the 1930 production. Old airplanes, it would seem, never wear out and are never abandoned and their losses from all causes continue up to an almost indefinite age in the form of scrap. In fact, in a year about 5 per cent of all the ships sold, donated, sold back to the war plane Landlord fleet to Paris or rather, and more than half the total number are beyond their fifth year of life. No one need hesitate about buying a used plane of 1928 or 1929 variety for fear of some sort of obsolescence.

Some still more striking conclusions come off the black and white and cross-hatched pie at the right. Astonishing as it may seem in view of the present reduction of ships and production, just 68 per cent of all the licensed planes in the United States are two or three-year-old open cockpit jobs with engines of 60 hp. or more, and that 69 per cent about exactly two-thirds date back to 1929 or before, including over one-third to 1923 or earlier. Of the smallest cabin ships just three-fifths are pre-1930 those being mostly the Carlini Boland. Older planes for less or more may not be as much a quarter of the total registry but only a small fraction of new airplanes go back as far as 1929. The worth of their segment will steadily increase as that occupied by the open cockpit



Licenses and identification. The decrease in 1931 is (up to now) the all-time high. The percentage shrinkage in the number of planes in service has been hardly more rapid than the reduction in the number of automobiles kept licensed.



Licensed airplanes today, divided by type and age groups. Half of the licensed airplanes the total number of a type in service, the total depth of the black and cross-hatched portions of each represent the proportion of machines of that type that are more than five years old and from those in five years, respectively. Ships in regular transport service were omitted from this calculation.

ships diminishes, but it is likely to be at least another three years before the older designs will have a clear majority of ships in service. A pre-1930 light plane, it will be observed, is valuable, not because they don't last that long (though their percentage of elimination seems to be quite a bit higher than for the larger ships), but because more was being built in that hectic period. Two-thirds of all the light planes in service still date from 1928, the year of the Curtiss-Wright, Jr., and the Bell Pup. They survive to the number of a little over 150.

Editorials



Business Ahead!

IN THE man of pictorially presented information that fills the preceding pages, no section is more interesting than that devoted to what for want of a better name we must call "Miscellaneous Flying." It gives the record of the private owner as he has reported it to the Department of Commerce. It gives the record of the hundreds of schools and flying services of every description that have grown up and conduct their business on a thousand airports. Study the story the figures tell, and you will find there two particularly pointed indications. The first is that private flying has continued to grow through the depression, both in the number of personally active owners and in the amount of use they make of their planes, the second, that aerial service, though it has been changing its nature has been losing nothing in importance.

We have analyzed the figures elsewhere and we shall not repeat it here, except to put it in an sweeping summary that quite aside from the prospect of better social safety and of more service to be done for private owners as a result, recorded facts make it easy to look ahead to a volume of cluster and industrial and miscellaneous service operation greatly exceeding anything that has been known up to now.

This is, it will be easy to anticipate that if it be handled rightly, and if the business be properly developed there is no business that has more to gain than this one from good management, and none that can be more easily destroyed by sloppiness. So here, as we look forward to increasing activities, is a check-list of

a few things that seem to us to come under the head of good management. The list might be much extended. We shall extend it from time to time, and return also to the matters listed here for fuller and more individual discussion. More than that, the volume again will always be as the door-mat for correspondence from any of our readers who have found recipes for better business on their own account.

1. Make the operations distinctive. Identify the company's airplanes with an easily distinguishable color scheme or insignia. Find a good name for the service, catchy, appealing, easy to remember and easy to say, and publicize it.

2. Study the community in which you work. No two are exactly alike. Find the people who have money to spend and study their tastes, and then make your headquarters the kind of place that their interests and behavior suggest that they might want to come to. There is more profit in establishing friendly relations with half a dozen wealthy business men than there is in getting a whole Coney Island crowd to turn out and stare at the parachute jumper on a Sunday.

3. Close up and keep close—building, anchorage, and more. Keep miscellaneous work out of sight is the danger. This needs no argument, but visits to many airports prove that it does, need repetition and emphasis. It is vitally important.

4. Sign up a good publicity man, if necessary by arranging to give a local journalist a little free flying time in return for his services, and make it his job not only to get into the papers the stories of the contracts you fill and the services you perform, but to self-peddle any note of the occasional sale.

5. Make sightseeing what the name implies. "Hop flying" diminishes with the number of the undropped, but there is no end to the number of visitors in Washington or Chicago or Los Angeles or a hundred other places that would like to look things over from the air. No matter how often he has flown before, the tourist will always be a prospect for a trip like that.

6. Make customers for service into customers for planes by selling everyone that uses a charter service something about the clip, about what it costs to buy and to operate and about how simple it would be for him to learn to fly it himself. Even if he never becomes a prospect himself, he will pass the information along to his friends with the story of his own trip.

7. Take the lead in forming and managing flying clubs (on which highly important matter, we promise much more later).

Flying Equipment

Fairchild Amphibian

A new high performance utility transport for Pan American's Fleet

Sixteen months ago Pan American Airways announced the award of a contract for six single-engine amphibians to the Fairchild Aviation Corporation. These machines, planned for off-line feeder services on South America and other foreign waters, not only had to meet the same rapid specifications written for the Clippers, but also had to guarantee top-notch land plane performance coupled with amphibian utility. Primary requirements were high efficiency, suggestions of structure and ease of maintenance.

In the December, 1933, AVIATION, a preview of the ship appeared—rehabilitating aviation's reputation, engineer's predictions for available now are actual photographs, performance test results—for ship No. 1 made her first flight on April 3 and is now undergoing acceptance tests under the supervision of A. A. Gurnea, chief engineer of Fairchild's Military and Transport Division.

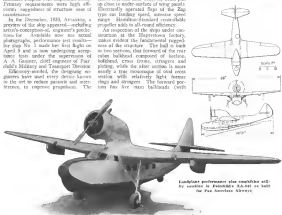
Efficiency-minded, the designing engineers have used every device known in the art to reduce parasite and interference, to improve propulsion. The

hull aggregates optimum aerodynamic shape, its lines are smooth-flowing, the ship mouth flush rounded. Wings are full rounded, tapered, of reasonably high aspect ratio—also smooth-stream, flush-skinned. Engine nacelle is clean-cut. Everything that can be streamlined, streamlined. Main wheels come up to disappear entirely in under surfaces of wings, tail wheel simultaneously withdraws into hull after-body, top floats pull up close to under-surfaces of wing panels. Electrically operated flaps of the Zap type cut landing speed, advance speed range. Removable standard convertible propeller adds in off-road efficiency.

An inspection of the ship under construction at the Hagerstown factory, makes one feel the fundamental ruggedness of the structure. The hull is built in two sections, that forward of the rear cabin bulkhead composed of fuselage, bulkhead, cross frame, struts and piling, while the after section is more nearly a true monocoque of oval cross section with relatively light former rings and stringers. The forward portion has five main bulkheads (with

water-tight doors to divide it into six compartments, any one of which may be flooded and the ship remains afloat), with lighter intermediate frames fitted into Z-sections of flat dural sheet. All frames are machined out near the skin to allow longitudinal stringers to pass through continuously between the main bulkheads. Side stringers are Z-sections rolled of dural sheet but heavier stringers are of extended dural. Even the external spray strips along the fuselage bottom are structural members.

The wing is in three sections, a 13-ft. center section and two outboard panels, lifting wing is of the one-piece type, airtight forward throughout. All covering



Load-bearing performance also simplified still—by combining in Fairchild's A-10-100 the hull for the Pan American Airways.

Next: Next of the Month now follows the development section (see Contract Page)

problem inherent in most domestic operations. Looking for equipment to replace standard types, aircraft executives, it has been decided that the 3-engine Ford (now displaced in the United States by Eaker, long-range equipment) converted to a four-seat version is seasonally well adapted to the Stacks requirements. The first unit, a Model 5-AT-D, fitted with 420 hp. Wasp engines, purchased from United Air Lines and mounted on fold floats, is now feeding passengers and ATC men at North Beach Airport. It will shortly be ferried to Barraqueto to go into month-end operations.

The ship, with a licensed gross weight of 14,000 lb., is mounted on a pair of standard Model 16600 fold floats, each 35 ft. 7 in. long, 4 ft. 3 in. beam and 3 ft. 10 in. deep. The centerline track is 13 ft. 8 in. Complete float gear including struts and attachments, anchor compartments and water rudders, weighs 1,775 lb. Allowing 761 lb. for the normal landing gear assembly, the net excess to weight of the machine installation is 976 lb. Take off, full load, takes slightly over 12 seconds. Initial rate of climb is 960 ft. per second. At one level, cruising speed is 112 m.p.h. at 1,850 rpm. With normal water rudder installation, the ship has demonstrated its ability to maneuver safely on the water in winds in excess of 15 mph.

Custom Waco

New cabin series with performance and comfort extras

ON PAGE 121 of our April Directory magazine was made of a new custom-built Waco. Further particulars and a three-view drawing of this machine are now available.

Standard cabin Wacos of the price range from \$5,219 to \$7,000, dependent on power plant and auxiliary equipment. The new series, offering greater speeds, more luxurious accommodations, falls in the price range of \$6,630 to



Four float installation in Wasp-powered Ford for Stacks' Navigators. Above carries.

\$6,600, again varying with power plant installed. General arrangement of the new machines are typically Waco, but the fuselage has been modified somewhat to enlarge the cabin and to give better streamlining. Both front seats are adjustable for height and for leg-room and also the steering column has a few and also adjustment so that it can be put into most comfortable level flight position for pilot or saddle carrying structural dimensions.

For the first time on any Waco model, electrically-operated trailing edge flaps are offered as standard equipment. A sliding side tab on one wheel, adjustable in flight, is included to trim for lateral balance due to normal loads in the two wing tanks.

All fittings are easily removable for suspension of floats, and metal suspension plates are provided at all points where attachment must be adjusted.

General specifications include main span 35 ft. 0 in., length over-

all 25 ft. 0 in., wing area 239 sq. ft., top speed 150-167 m.p.h. (depending on power plant).

A. G. Crusader

An experimental type powered by Hispano

Born here and abroad, particularly in England, there are signs of a growing interest in the possibilities of two-engine installation in relatively small airplanes. Latest American work in this direction is an all-metal monoplane by the American Gipsy Co. of Denver, Colo. Chief characteristics are the mounting of two Hispano four-cylinder engines in the leading edge of the wings, the carrying of the tail surfaces on



Custom-built Waco for 1930 use offered with conventional Jacobs or Wright engine.



brackets, the provision of a streamlined cowling for passengers and cowling cowls. The first machine has accommodations for four passengers, although six-place models are planned for the near future.

The center section including the cabin, and the tail boom are of all-metal construction. Wing tip sections, left unswept and detachable beyond the nacelles, are fabric covered. Landing gear housing and the engine cowling are joined in together. Experiments are also being conducted with fully retracting landing gear.

Flight testing so far has been conducted with fixed-gear propellers but modifications are to be fitted. No actual performance figures are available. General characteristics are: span 36 ft., length overall 21 ft. 6 in., wing area 206 sq. ft., weight empty 2,000 lb., gross



Detail of Hispano B-4 engine installation and landing gear of the A. G. Crusader.

weight 3,000 lb., wing loading 14.55 lb. per sq. ft., power loading 9.6 lb. per hp.

Airway or Highway

Recent autogyro developments point way to road running aircraft

A. E. Lott, vice-president and chief engineer of the Autogyro Company of America, speaking before the Society of Automotive Engineers at Washing-

ton on April 1, sketched a picture of autogyro development for the immediate future calculated to stirle the conventionally minded. No more throttling was his tale of grace that tale off by leaving into the air from a standing start, or of ships to be driven under their own power over public highways, stored in suburban garages. Cautious has lately been downgrading the "gyrocopter" technique in England, and back in this country and abroad the flying rotor has been proven a practical mechanism.

Perhaps most striking innovation in the machine is now constructed by autogyro engineers is the relocation of the engine, making it completely at the forward behind the passengers but retaining the tractor propeller arrangement by transmitting power both to the rotor hub (for starting) and to the propeller shaft by means of a gear intermediate. With the engine in the side downward vision is obviously improved and it is also possible to work out a simple transmission to the undercarriage for vital propulsive. As for cooling the engine, enough information is at hand from recent work of the NACA and others to provide a solution. Little trouble is anticipated in the air where slightness velocities are relatively high, but on the ground additional cooling may be necessary from some form of auxiliary fan or blower.

No power is made of automobile road-ability plus the capacity to hop off into the air at will. The new design will, however, offer the private owner the means of housing his aircraft in his home garage and driving it to the airport under its own power.

Prophetic figures indicate that a machine of the sort sketched will have



An answer to the private owner problem? Autogyro by engine designers for the immediate future. The machine has flying rotor blades, one control rotor, power delivered to the landing wheels for ground maneuverability.

The Maintenance Notebook

More Propeller Notes

THE Maintenance Notebook for 1,500-lb. two-seater and quite another have the very large three-bladed controllable pitch propellers were housed in the shops of Pan American Airways at Miami and by TWA at Kansas City in both cases, the methods developed involved transportation for short distances only, then one part of the shop to another.

Pacific Air Lines Corp. at Union Air Terminal, however, takes care of all propeller adjustments and servicing for the Douglas Company at Santa Monica, and some means had to be devised to transport the large propellers safely over the 26 odd miles of road between Burbank and Santa Monica. Using the arrangement shown in an accompanying picture, dozens of propeller assemblies have been handled satisfactorily between the two plants. The welded steel frame is bolted to the flat bed of the truck and propellers are loaded from a mechanical hoist which runs directly into the propeller department. At the receiving end, the unloading and handling is done also by means of overhead hoist.

Among the numerous devices used at the Santa Air Station, Pasadena, for the handling of metal propellers in large quantities (some of which have already been illustrated in this department) is a rack designed to hold a num-

ber of propellers during the painting of the hub. Each entirely of wood, a built-in propellers in such a way that one can can easily turn them over for painting both upper and lower blade surfaces.



Truck equipped for transporting large propellers from Pacific Airways at Burbank to Douglas Aircraft at Santa Monica.

Clipper Compass Check

IT IS one thing to swing compass on a 1,100-lb. two-seater and quite another to do the same job for an 11-ton Pan American Clipper. Regardless of the size

of the ship, the same general procedure must be followed. The plate must be put in flying position, then after having been accurately aligned along a North-South bearing, it must be turned successively to the several points of the compass and the correction factor for the ship's magnetism entered on the correction card.

On the North end of the barge line on the beach at Pan American's Denver Key base, a large circular pad of concrete paving has been laid out for compass swinging. Mounted on bearing gear, the Clipper is skidded into the center of the compass circle behind one of the station's outboard cranes. At this point the job is taken over by a truck-mounted crane (shown in an accompanying photograph) from a local building contractor as shown in an accompanying photograph. With the hoist made fast to a fitting on the tailpost, the Clipper is



Swinging compass on a Pan American Clipper. It all on the beach at Denver Key. The truck-mounted crane is not part of the station's equipment, but is used in an emergency.

raised to level flying position. A man with a plumb line set up on the corner section of the wing controls the alignment of the ship with reference to some predetermined North-South line. Once the base line has been established the ship is skidded to the desired points of the compass simply by driving its truck around the circle, stopping as much as guided by the picture operator.

Douglas Servicing Platform

MENTION has been made in these columns of the efficient portable servicing platforms which have long been in use in the Kansas City hangars of TWA for servicing Ford transports. With the advent of the Douglas equipment, some changes had to be made to these units, that of which was the addition of an elevated platform (or tower) from which the nose compartment of the ship could be reached conveniently. As shown in the picture, the propeller assemblies and a large part of the engine cylinders and radiator boxes can be reached directly from the platform, and short movable scaffolds give access to

the upper cylinders, to the tops of the nacelles and to the forward hatch.

For adjustment to bushes and to permit the testing of the remaining landing gear it is necessary to raise the ship clear of the ground. This may be done either by jacking up under the wing ends on jacks provided for the purpose, or by raising the ship from shores by beams. TWA uses the latter method at Kansas City. Special beams attached to the front spar on each side of the nacelles from points of attachment for struts supported on the ends of two heavy chain falls hang on a pair of overhead cranes.

Portable Test Stand

ARRANGEMENTS for testing engines after overhaul range all the way from the simple expedient used by using a small operator at running-in where installation in the airplane, to complete engines in elaborate test houses in to complete practice with major sections. Midway between comes the use of portable test stands used by the shops of Curtiss-Wright Technical Institute, of Aeromarine at Grand Central Air Terminal, Cleveland.

Extensive portability is a primary requirement in this case for the actual running in done "on the line" at the field, and the mounting of the engines, containing up controls and fuel lines, etc., can best be done in the engine shop around behind the hangar lines and across the street. By mounting the whole outfit on an automobile-like chassis with pneumatic-tired wheels on roller bearings, two of which are steerable, the transportation problem has



Wide chassis test stand, fitted with everything composed of steel chassis units, forms an essential part of TWA's servicing equipment at the Kansas City base.



Domestic's weather testing rack. Portable racks for handling assembled propellers can be seen in the background.

Flying Services and Schools

• **WASHINGTON, D. C.**—At a conference April 2 and 3 under N.A.A. auspices, 74 delegates representing the Basic education of 24 American colleges voted to form a National Intercollegiate Flying Club and adopted a specific program to develop undergraduate flying and gliding. Roughly 1-4 annual intercollegiate meet will be held in the Middle West late in June, 2-4 schools are to be presented to college men, 3-4 reference to college flying is to be more widely disseminated, 4-4 an intercollegiate conference will be held each year. Officers: William D. Smith, president of Stanford College, president; Raymond H. Gower of Purdue University, vice-president; Earl M. Bennett, of the University of Minnesota, secretary; Thomas E. Goss, executive counsel; Donald A. Martin, of the University of Minnesota, Joseph B. Hartnett, of the University of Pennsylvania.

• **CAMBRIDGE, MASS.**—The Harvard Club, practically inoperative for the past several years, has shown signs of a return to full activity. Under President George Fox, 3rd, at 25 members plan to have a ship, trips for various representative events, and a May and June promote interest in flying among students not in the club. Much discussed and 75 enter a Harvard pilot and pilot in the Olympic flying competition at Berlin in July, 1956.

• **WASHINGTON, D. C.**—Under the past several years of a group headed by Chester J. Warrington, president of the Aero Club of Washington, the Sportsman Pilot's Association has been reorganized. At its opening convention, Clarence M. Young was elected president, Mr. Warrington first vice-president, and Dr. John D. Stock of Kansas City, second vice-president. Among events tentatively scheduled are a tour to Missouri in June and a fall tour to White Sulphur Springs.

• **PLAINFIELD, CONN.**—Ex-Governor John H. Trumbull, enthusiastic plane-owner and active pilot, is the new president of the Private Pilots' Association, reorganized last year to promote the interests of that group. William W. Buecklerhoff is secretary, Grace Webster secretary.

• **LAS ANGELES, CAL.**—Donk Whiss, formerly general manager of Durbin Air College, has opened a new school to be

known as Imperial Air College offering a two-year course for student mechanics, a two part course in aeronautical engineering, and a special one-month course in aeronautical training. He also has plans for entering the low-priced maintenance field.

• **GLASSBORO, CAL.**—To the faculty of the engineering school of the Curtiss-Wright Technical Institute of Aeronautics and Robert Rowland, once chief engineer for Transair and designer of the 1929 Thompson Trophy plane. Nelson Grant, operating in aerial laboratories at Dayton, has also joined the faculty of the Institute.

• **SAN DIEGO, CAL.**—To the position of director, George C. Ryan, School of Aviation, recently left pilot for Continental Motors, and once pilot for Ryan Aircraft.

• **Other flying school news:**—At the California Pacific International Exposition which will open in May at San Diego, August 25th, will be America's Schools of Aviation Day, the Ryan School to play host. Institutions will be open to students at all flying schools throughout the country to participate in flying schools that school applicants to San Diego Airshow in June for competitive events Aug. 28.

• **CHARLTON, CAL.**—The name of William D. Stock has long been associated in the field of airplane design with a flair for responsibility, with a reputation to depart from the beaten track when such departure seemed justified. Flying alone that a trophy recently presented to the Boeing School of Aeronautics by Mr. Stock will stand as an aerial award for the most original practical airplane design completed by a student. Mr. Stock is at present resident in president of the Society of Automotive Engineers as head of the Street Engineering Laboratories.

• **CHARLTON, CAL.**—For the past few years William Edward Boring has offered scholarships for courses at the Boeing School to undergraduates in Aeronautics and Aeronautical Engineering the best scores on aeronautical subjects. This year's winner: Charles Gilbert Sperry, University of California, Richard J. Jenkins, University of Minnesota. First award represents a complete Airline Pilot Course—valuation \$2,000. Second award an Airline Technician and Assistant Pilot

Course—value \$1,000. Now the race is on for W. H. Boring Junior Scholarship for high school student in California, Washington, and Oregon. Winner Joe Franklin Schumacher, Riverside, Cal., who receives the Airline Operations and Assistant Pilot Course Value \$1,000. Second award goes to Vernon Leroy Prueber, Yakima, Wash. He receives the Airline Mechanic and Assistant Pilot Course Value—\$1,300.

• **DECATURVILLE, IND.**—A state-wide committee to make arrangements for the Seventh Annual Indiana Air Time June 17-20 has been appointed by Frank E. Bell, president of the Indiana Aircraft Trade Association, which is sponsoring the race. Charles E. Cox, Jr., manager of the Municipal Airport, is chairman. Other report sponsors serving on the committee are Lawrence I. Aron, of Lafayette; Michael Murphy, Kokomo; Clayton F. Cornish, Fort Wayne; Clarence Dowling, Terre Haute; and E. F. Ball of Muncie Aeromarine Corporation, Muncie. Executive members are Walter M. Wesslow, president of the Indiana Chapter of the N.A.A.; Herbert O. Fisher, director of aeronautics for the Indiana Chapter of the Civil Aeronautics Administration; Richard Aron, president of the Central Aeronautical Corporation, Indianapolis.

• **HARTFORD, CONN.**—First intention of a photographic survey of its entire territory being conducted for by a state government at the project lately completed by Fairchild Aerial Survey Aircraft Commission. All maps covering the 5,000 square miles of the state are now on file at the State Library, for the use of various state departments, local governments, business and industrial companies. Four phases did the work in 153 flying hours.

• **CHARLOTTE, N. C.**—Thomas H. Smith, operator of a flying service at Patten Field for the past two years, is now chief test pilot for the Taylor Aircraft Company at Randolph, Va. Mr. Smith previously served as co-pilot on Pan American Airways Miami-Havana run, also worked for Curtiss-Wright at Miami.

• **BEVERLY HILLS, N. Y.**—Estate owner of the most valuable town, who for several years had objected strenuously to show flying and air meets at the local airport, finally expressed a special corporation, permitted the 124

acre field, increased they would divide it into small building lots. Purchase price \$25,000.

• **HOUSTON, TEX.**—Following report from the State Survey Airport, J. L. Schneider who has been identified with a local re-organized supply house for G.I. items, was appointed manager. G. G. Russell formerly with the American Aviation Academy of Shreveport, La., is in charge of student instruction at the airport.

• **SAN ANTONIO, TEX.**—John A. Alless has been named as manager of the city airport for the coming year, his appointment dating from April 1. Mr. Alless had been connected with the administration at both the Harborside and Harborside airports.

• **NAMPA, N. H.**—Plans for the construction of a modern brick hangar and administrative offices on the municipal airport have been approved by the State Commission on Aeronautics. It is estimated that the building will take three months for completion, will cost \$35,000.

• **SHEKANE, WASH.**—Wallace Aerial Surveys has received a contract to map 5,000 square miles of national forests in Western and Idaho. Possible mapping crew—B. S. Cooper, H. H. Wallis.

• **CINCINNATI, OH.**—The committee, appointed by Public Works Administration, is now reviewing recommendations for the improvement of the Municipal Airport has submitted a report regarding (a) elimination of railroad tracks now haunting the airport, (b) extension of the runway, (c) widening of the

terminal highway leading to the airport from the Loop. The report estimates the cost of these improvements at \$1,100,000. Last January the commission approved a proposal for an island airport on Lake Michigan after the city had applied for \$100,000 of Federal funds for the purpose.

• **PORTLAND, ORE.**—The Sportsman Pilot's of Oregon, organized at the airport last year made a half-dozen week and more out of Portland in Oregon and Washington towns this year has adopted a program, plans to try at first next a month. President, W. Roy Schuchman.

• **TRAVLER, CITY, MISS.**—Sponsored jointly by the city and Grand Traverse County construction work is again under way at the Municipal Airport. Remains will be 5,000 ft long in all directions. Construction cost, including hangar \$25,000.

• **ALBANY, N. Y.**—Led by Robert Aldrich, director of the Troy Airport, managers of airports throughout the state are opposing to opponents in the development of airport operations. A program is scheduled in the immediate future for election of officers, adoption of a program.

• **WASHINGTON, D. C.**—The House of Representatives subcommittee appointed to study possible sites for a municipal airport has scheduled its report concerning the Greenville (Pa.) site as available because of the true necessity for developing it properly, the uncertainty of the project, and its proximity to Service airports. The report recommended that an adequate commercial airport be established immediately.

at a cost not to exceed \$2,500,000 and that a commission of seven be appointed to select a site, consisting of the Director of the Bureau of Air Commerce, the Second Assistant Postmaster General, a member of the House of Representatives, a member of the Board of District Commissioners, a representative of the air transport companies serving Washington, and a local official. After the selection of a site, President Roosevelt would be directed within 30 days following purchase or lease to make a statement of three persons representing within 10 miles of Washington to direct operations of the airport, appoint a manager, and report annually to Congress on fees, rentals and general conditions.

• **COLLEGE PARK, MD.**—The Washington Air Derby Association is sponsoring the third annual Langley Day Air Meet May 5. Feature of the colorful day event is a glider spot-landing contest.

• **BIRMINGHAM, N. Y.**—Assistant manager of the Municipal Airport for the past two and a half years, James Beck with soon assume the management of the field at Plattsburgh when arrangements are in progress. Mr. Beck has been a transport pilot's license and will give instruction and survey in glider flight in a New Standard trainer, a Curtiss Robin, and a Ryan.

• **WASHINGTON, D. C.**—Official opening of Miller Municipal Airport, newly renamed and modernized, took place April 15. With new concrete runway and a modern lighting system, the field is now a regular part of call on Eastern Air Lines' route from Newark to New Orleans.



WICHITA DEDICATES

a new administrative building at its municipal airport. Part of the large crowd which turned out for the ceremony and most activities on May 15 in light of crowded weather.

Aviation People

• **NORMAN Y. CLEMENTS** has been named advertising manager of the Chance Vought Corporation to succeed **JOSEPH M. BARR** who has been elected treasurer. Clements, who has been with Chance Vought since 1932, was previously vice president with the Curtiss Aeroplane & Motor Company, later with an advertising agency in New York City.

• At every newsmen from **ROYCE LAW** to the youngest thirty-year has today, regularly in aeromedical equipment, one another. First indication that the cabin may be flying was the appointment of **FRANK OCHS** as Special Assistant for Air Intelligence to the N.A.A.A. (Aviation, September 1948). Add now the employment of **HARRY BUCKLEY**, co-founder of the women's cadet corps, to the regular corps as "Control Officer" Washington, D.C., the announcement that **ANGELA BARRETT** will serve with the flying personnel of the Bureau of Air Commerce in the construction of new directional radio apparatus. With Miss Barrett's status, similar to that of **CHARLES L. LORING** under the former civil administration, goes a salary of \$1 per year.

• **SEYMOUR WILLIAM G. McLEOD**, president of the National Aeronautics Administration, has been named as the Collier Trophy Committee for 1953. Col. **EDWARD S. GORDON**, chairman, Major **JOHN H. HARRIS**, Chairman, **CHARLES L. LORING**, **WILLIAM B. SPOFF** and **ERNEST P. WARRICK**, Colonel **GORDON**, former head of the State Dept. Air Commission, has been mentioned in active interest in aeronautical affairs. As a War Post syndicate, he entered the Air Service of the Army in 1914, served in Moscow, later was Chief of Staff of the Air Service under General Pershing during the World War, most recently served on the Editor Board. The rest of the committee adds an introduction to AVIATION readers: Mr. McLEOD is himself a former recipient of the Trophy.

• The **R. T. BISHOP**, who has been named general sales manager of the Standard Oil Company of New Jersey and its affiliated companies (Elmwood, Pennsylvania, and Colonial Beacon Oil Company), taken over the duties formerly carried on by **R. G. SUTHERLAND**, now an independent sales executive. Dr. Bishop's connection with the Standard Oil Company dates from 1923.



Norman Y. Clements



Royce Law



Angela Barrett



Charles L. Loring



Seymour W. G. McLeod



R. T. Bishop

• With the elevation of **GUY YADKIN**, president of Wright Aeronautical Corporation, to the presidency of Curtiss-Wright Corporation (Aviation, April), two Wright executives were promoted to higher positions. **WILLIAM J. GORDON**, formerly vice-president and assistant general manager, becomes general manager. **GEORGE GARDNER**, formerly vice manager, becomes vice-president in charge of sales. Both Gardner and Gordon have service during the World War, Gardner joining the Wright company in 1929 after a work experience in factory management. Gardner, an airplane producer, returned to the Naval Air Service and 1935, when he returned to join the Wright service manager.

• **JAMES S. WHITE**, vice-president and general manager of MacVick Company, Knoxville, has been elected president of the National Aeronautics Association (Aviation).

• **CAPTAIN ALBERT J. WILLIAMS**, leading figure in American aviation as a racing and aerobatic pilot since the early twenties, has joined the consulting staff of the Roosevelt Aviation School, Roosevelt Field, Long Island. Although Captain Williams plans to continue his activities as writer-director of the Gulf Stream Company and as a writer and radio commentator on aeronautical developments, his new position will include serving with the staff as a coordinator and training methods, lectures to the school's students and as active participation in the advanced flying instruction.

• **RAY T. BROWN**, sales manager of the General Tire & Rubber Company, has accepted appointment by President W. G. McLean of the National Aeronautics Association as chairman of the committee to perfect the rules for defining stock model airplanes for contest purposes.

• **S. L. GARRETT**, for many years president of the Saunders-Tubing Company and several times member of the Board of Governors of the Aeronautical Chamber of Commerce, has secured his connection with the Saunders-Tubing Company, became associated with the management of the Superior Tube Company of Macarthur, Pa.

• **RAY NEWSON**, racing pilot, died at Los Angeles March 28 of a heart attack following pneumonia. An outstanding

contestant at the National Air Races of 1933 and 1934 and at the Chicago International Air Races of two years ago, Newson had recently been radioed during the airplane races at the Indianapolis by the National Aeronautics Association.

• The United States Geologic Company at Silverdale, Pa., has recently added **J. VAN D. WATKINS** to its staff as research engineer in charge of aeronautical developments. Coming to the new job after five years' service as research assistant in aerodynamics at the Massachusetts Institute of Technology, Mr. Watkins has had as a first task the construction

of the development work on a manifold pressure gauge for aircraft engines.

• The most intensification of aircraft manufacturing and exporting activities on the West Coast has led the Pratt and Whitney Aircraft Company to open a general office in Los Angeles and to name **WILLIAM P. GIVENS** as their West Coast representative. Mr. Givens has been in the company's employ since 1927 and has had a wide experience in aircraft manufacturing, servicing and sales departments. He will make his first headquarters at the Hotel Roosevelt in Hollywood.

of "Second Hand," with a view to attending to the parts to whom they, and heavy of to cover up worn parts, and cylinders and loose bearings. We actually began to see the engine parts of the engine will never be allowed the same plane formerly owned by the Baptist minister who used it only for going to church, and who gave it away later than twenty miles or more in any time.

We see that the committee at Geneva after years of debate, have finally arrived at the decision of a military airplane as one carrying machine guns, and/or bomb racks, and/or torpedo launchers, whereas civil aircraft are those without this equipment. Over here the distinction could be made much more simply. Civil aircraft are those having their development blighted by the Purley regime, whereas military aircraft are those supporting the political aspirations of Rye and others.

In connection with the recent outburst of the American fight in Russia, and when it is appearing to read that the Engineering Office of the flight had to keep a record of the readings of various engines, we see the same before him. When one considers that only a few years ago the empty hole in a "Jew" airplane had been converted into a place for mounting guns or bombing bombs, that one comparison shows the remarkable progress which aviation has made recently.

We see by the paper that Heller was presented with 41 military airplanes on the occasion of his forty-ninth birthday—127 presents by the New States (Aviation and Aviation) by the expression of Generalissimo Vargas. This should be an excellent idea for our own military and civil aviation manufacturers for presenting presents to their customers. We see the ships in bright colors, calligraphy and



blue ribbon, and work up a series of leafy greetings such as the telegraph message: "Dear Mr. Heller, Aggravate message might be: 'Happy Long congratulations Secretary Heller on the occasion of his anniversary and presents from your humble servant (Heller)' which is now on the way out. The American Air Line Operators Institute Mr. Purley and present him with an entire complete with messages, cables, mail containers, and other equipment, with the agreement that he is operating it for a while.

Side Slips

By Robert R. Osborn

It is refreshing to find that our best pilots will readily admit having been lost on some of their flights, instead of blaming their errors on misguidance, as we often suspect pilots of lesser ability.



Of course, after wandering around in lost circles and fog for half an hour to coast round flight, James Doolittle's comment was "Yes, I got badly lost—quite the old man is slipping." Now Max Eastman explains his failure to make his Los Angeles-Mexico City flight non stop by saying he just got lost and had to land to find out where he was.

We happened to be in "Merry" McLeod's office when he was managing the old Curtiss Flying Service, when Bill McKinnon returned from a cross-country flight on which he had washed out a new ship.

"What happened, Max?" asked Merry "Well, Max," and I said, "The ceiling was right down on the home top and I was bumpy-bumpy along trying to figure out what to do next. Suddenly I ran out of gas in my tank, and decided to land where the gas tank was low enough to do something about it. So, I cranked up in somebody's back yard with plenty of gas about."

"Well, it's no disgrace!" said Merry. "I know it's wrong to waste gas, but enough I'd finally got to know pilot."

Arrive her loved landing Max Eastman reported considerable difficulty in finding out where she was, and where was on the Mexican farm who could speak English. This recalls Wiley Post's story of his recent round-the-world flight. He was trying to find Ixtoc to know, and he had been flying over a log back for hours he weren't sure whether he had done just it or not. When he finally came down through the clouds he was on the railroad which passed through the city but he could not tell if he should keep going or turn about. In a field he saw two men working on land to catch crocodiles. He claims that most Mexican words can be pronounced by the phonetic sounding of the names just as they are spelled, so, to the two men he said "Ixtoc," pointed up and down the railroad, and shrugged his shoulders to indicate flight. One man pointed up the tracks and the other down, and returned to do so after much argument between themselves. So Mr. Post asked the more confident appearing of the two men, took his advice, and found it good.

It is unfortunate to notice the recent increase in the advertising of seed airplanes for sale, another good sign of returning prosperity for the commercial airplane manufacturer. Most of the advertisements are very creatively worded, leading us to believe that our seed airplane dealers will maintain a higher level of worth than it now followed by the general run of seed-bank air salesmen. It will be just too bad if the airplane business ever falls down to the level of "Rosespones" airplane entrap-



Buyers' Log Book

AVIATION'S Card Index of New Equipment

This department is designed to help readers locate manufacturers at ship yards, associations or otherwise

AIRPLANE ACCESSORIES

Instruments—Light

Pioneer Instrument Company,
739 Lexington Ave., Brooklyn, N. Y.

NEW indirect lighting system for instruments consists of glass rod mounting individual dials through which light is conducted from a small electric lamp. Gives evenly diffused illumination, no glare. May be built in or supplied from auxiliary to standard instrument without major change in case. Controls fully shielded. No electrical connections on case.

AVIATION, May, 1935

INSTRUMENTS

Manifold Pressure Gauge

Detroit State Gauge Company,
44 Beaver Street, New York, N. Y.

A SENSITIVE pressure and vacuum gauge with range 14 in. Hg. to 30 in. Hg., has single sealed pressure capsule with solder arm to seal and piston transmission compensated for temperature. Sealed pressure-light case. Flexible manifold connector buffered to damp out rapid pressure fluctuations. Some models include oil-take hand which cannot be reset from outside oil case.

AVIATION, May, 1935

MATERIALS

Safety Glass

Amersham (Plexiglas Glass Company)
Pittsfield, Pa.

PLEXIGLAS is a new safety glass with a flexible binder designed to dent or yield on impact and at the same time prevent glass splinters from flying. Binder allows clear light transmission, free from haze. Plexiglas has low rate of signal transmission. May be cut and installed with ordinary tools. Edges require no finishing. Available in six standard styles—3 1/8 to 6 1/2 in. thick.

AVIATION, May, 1935

PARTS

Ball Bearings (Catalog)

Raylor Bearing Company,
New Britain, Conn.

THIS company has issued a 26-page booklet "General Control Bearings" containing a general review of current aircraft design by more than twenty manufacturers listing Raylor ball-bearing controls. Illustrated are particular design features such as landing gear mechanisms, rubber assemblies, elevon joints, aileron hinges, etc. Copies may be obtained on application.

AVIATION, May, 1935

PARTS

Exhaust Manifold (Catalog)

Solar Aircraft Co.,
Emberly Field, San Diego, Calif.

NEW bulletin has been received describing a number of installations of Solar stainless steel exhaust systems. Covers complete specification and outlines dimensions, data, etc. required for new designs. Manifolds are designed to provide fast smooth gas flow, eliminate leakage. Built in accordance with slip joints to be easily detachable for engine maintenance.

AVIATION, May, 1935

RADIO

Aerobac Transmitter

Triumph Radio Electric & Mfg. Co.,
Chicopee Falls, Mass.

NEW 10-watt transmitter designed to operate from 110-120 volt 60 cycle A.C. source. For telephone or megaphone, up to 5000-6000 ft. Crystal controlled master oscillator. 100 per cent modulation. Remote control. Transmitter and mounting weigh 4 1/2 lb. Engine driven A.C. generator (29 lb.) also has 14-watt D.C. winding. Well known also as dynamotor from 52-watt battery.

AVIATION, May, 1935

RADIO

Tuning Selector

Smathers Deane, Inc.,
120 North Juniper St., Philadelphia, Pa.

SEMI-AUTOMATIC tuning for airmen and other radio operators available through new type frequency selective switch. A series of relays is connected as close as possible to the transmitter tuning coils (to reduce capacity effect), with contacts arranged to short circuit sections of the coils as required. Relays operated from independent switch to control panel.

AVIATION, May, 1935

SHOP EQUIPMENT

Gas and Air Purifier

The Alexander Malters Company,
1818 West Railway St., Baltimore, Md.

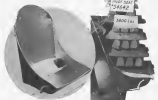
PURIFIER for conditioning air or gas for paint spraying, welding, etc., has glass shell through which any accumulated oil, moisture or dirt can be seen. Series of perforated plates and screens remove foreign particles. Simple has few parts, quickly and easily disassembled. Fitted with full size 9-in. diaphragm regulator with calibrated pressure gauge.

AVIATION, May, 1935

B E N D I X

THE DRAGON OF AVIATION SAFETY

BENDIX PILOT SEAT



WEIGHT 6 1/2 LBS.



WITHSTANDS

STATIC LOAD OF 3800 LBS.

Meets Army and Navy Requirements

AIRPLANE WHEELS •
BRAKES • PILOT SEATS
AND PNEUDRAULIC
SHOCK STRUTS

BENDIX PRODUCTS CORPORATION

AIRPLANE WHEEL AND BRAKE DIVISION • SOUTH BEND, INDIANA

Exclusively of Bendix Aviation Corporation

Why make her buck



TEXACO Aviation

TEXACO AIRPLANE OIL ★ TEXACO AVIATION GASOLINE
FOR RUNWAYS, HANGAR FLOORS, APRONS AND DUST

THERE IS AN EXTRA MARGIN OF SAFETY, SPEED

two headwinds?

You can't choose your weather
but you can your oil



One head wind is enough for any pilot—the sturdiest plane. A good many pilots have to fight two headwinds because their oil is not always right.

Texaco Airplane Oils are carefully refined from selected crudes especially for aviation service. They are remarkably pure. Their resistance to sludging helps to reduce overhead costs. Under all types of flying conditions, Texaco Airplane Oils will maintain pressure. They provide an increased engine pull. They are an important factor in our safety.

Skilled pilots — leading airlines

Pilots, who know their skill depends upon engine performance, are particular about the oils they

choose. Many pilots in all fields of aviation prefer Texaco Airplane Oils because of their proven dependability. Such leaders of commercial aviation as "T. W. A.," "Bowen," "Pacific Air Lines," "Northwest Airlines," "Delta Air Lines," "Chicago & Southern Air Lines," agree that Texaco Airplane Oils have a superior lubricating ability.

At all airports you will find Texaco Airplane Oils and a complete line of Texaco Aviation Products. In selecting the oil best suited to your ship, you can always depend on the helpful, friendly service of Texaco dealers and representatives.

THE TEXACO COMPANY

335 East 42nd Street New York City

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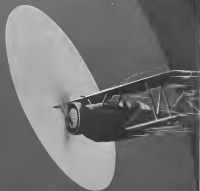
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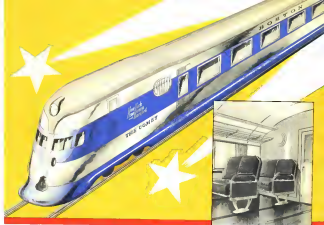
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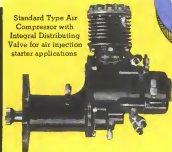


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